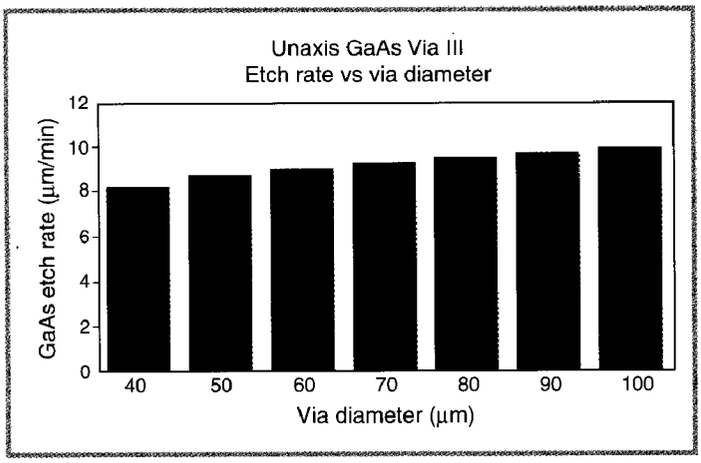
New high-rate GaAs via etch solution



Etch rates for Unaxis Semiconductors' GaAs via III solution.

Unaxis Semiconductors has released its GaAs via III, 3rd generation high-rate GaAs via etch process solution. Key features include pillar (needle) free via formation - Process and hardware developments can reduce pillar formation to zero, independent of substrate type; improved GaAs Etch rates > 10 µm per minute have been demonstrated resulting in reduced cycle times; and slope-independence - in the past a controlled sloped via process nearly guaranteed some degree of pillar formation.

Notker Kling, Vice President of the Telecom Strategic Business Unit at Unaxis Semiconductors states, "Our 3rd generation GaAs via etching technology can provide our customers with the highest rate via formation in the industry coupled with increased yields due to zero pillar formation. This new process technology... ensures that the Unaxis GaAs via III solution results in the lowest CoO.

"Several equipment companies today are claiming extremely high-rate via etching. Indeed, Unaxis Semiconductors has achieved GaAs via etch rates in excess of 15 µm/min. But these days, fast etch rates alone are not enough - particularly if the increased rate comes at the expense of etch rate uniformity, via profile or the formation of pillars - which may negatively impact yield. In summary, the Unaxis GaAs Via III solution provides a highly uniform, production-worthy, high rate, pillar-free, sloped GaAs via etch process."

New nanocluster deposition system debuts

Newark, NJ-based OAR has launched a complete UHV system, the NANODEP-60, for the deposition of nanocluster materials. Nanoclusters have been found to exhibit unique electronic, chemical, optical and magnetic properties, which cannot be obtained by conventional deposition methods.

The NANODEP-60 produces beams of well-defined nanocrystalline particles using the gas-condensation method. Sputtered material is induced to condense into nanometer sized particles in a high pressure, cold clustering zone. The emerging beam consists of nano-crystalline particles with a narrow size distribution. A special high scanning quadrupole mass filter is incorporated to optimise the distribution and to augment the beam by refocusing it toward the sample.

The NANODEP-60 allows for the investigation of zero-dimensional systems without recourse to thermal or lithographic processing. Alternatively, an ionised cluster beam can be accelerated toward the substrate to produce highly adherent and uniform coatings. Compound films can also be deposited in a reactive gas environment.

The system configuration provides for numerous entry ports for the addition of a variety of other deposition sources and analysis tools for optimal process flexibility. A heated rotary work table, substrate manipulator, substrate ion-cleaning facility and system load lock are among the options.

OAR says applications include contact hole filling, magnetic and optical data storage, catalysis, and investigations of the luminescence properties of Silicon clusters.

Equipments & Materials Processing

Keith Evans, former vice president of business development for IQE, has joined Veeco-Applied Epi as vice president of Advanced Technology.

"Keith has extensive knowledge of MBE and metal organic vapour phase deposition technologies from his experience at IQE, the world's largest epiwafer manufacturer," said Martin Braun, general manager, Veeco-Applied Epi. "We can think of no one better to lead our company's expanding team of MBE scientists as the silicon and compound semiconductor markets converge."

Unaxis Semiconductors has launched the LEPECVD 300 Semiconductor Equipment Assessment (SEA) project following endorsement by the European Union.

The LEPECVD 300 program is the second joint project of ST Microelectronics and Unaxis on SiGe technology. The ECOPRO-SiGe project, started in 2001, was to develop an economically viable, dependable process for producing SiGe layers on 200 and 300 mm wafers.

The objective of the present project is to assess the performance of a new industrial Low Energy Plasma Enhanced CVD (LEPECVD) tool at ST Microelectronics/LETI in Grenoble. This new system is designed for low temperature deposition, high throughput of both silicon and SiGe layers. It is fully automatic and as a bridge tool it accepts either 200 mm open cassettes or 300 mm FOUP.

The project will focus on reliability and cost of ownership of Unaxis' new production system. Other companies involved include Picogiga (France), Motorola (USA), and Wacker (Germany).

Nanoscale features brought within reach by photoresist research techniques

New methods reported in the July 19, 2002, issue of *Science* by researchers from the National Institute of Standards and Technology (NIST), the IBM T.J. Watson Research Center and the University of Texas at Austin could aid the semiconductor industry's search for new photosensitive materials needed to print integrated-circuit patterns with features less than 100 nanometers.

Using X-ray and neutron probes, the team directly measured the spatial location of the complex chemical processes used to sculpt the transistors, lines, trenches and other minuscule components of the silicon-chip landscape. The almost-molecular level view of a model system afforded by their methods enabled the researchers to link the reaction front along chemically amplified photoresists to the profile and composition of the final developed, or "printed," structure.

In the *Science* paper, the researchers point out that, in 2003, the semiconductor industry aims to produce chips with feature sizes smaller than 100 nanometers - Intel is already producing samples of its next generation Pentium 4 microprocessor, codenamed Prescott, at 90nm.

"The critical dimensions must be controlled," the team notes in the paper, "to within 2 to 5 nanometers which is comparable to the characteristic size of the [individual] polymeric molecules in the photoresists used to pattern the features."

With the measurement methods developed by the NIST-led team, the semiconductor industry has a direct means to resolve this concern and other important unknowns.

For a copy of the *Science* paper, "Direct Measurement of the Reaction Front in Chemically Amplified Photoresists," go to www.sciencemag.org.

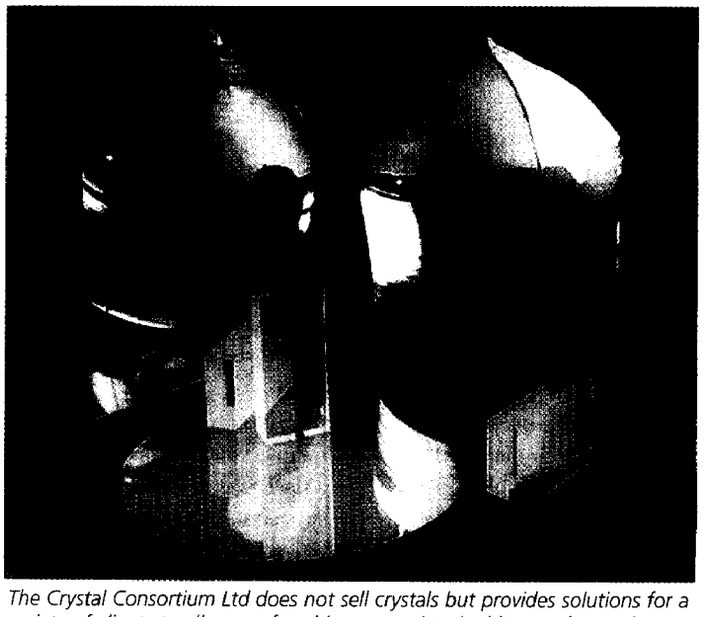
QinetiQ university joint venture to hit £1m sales next year

The Crystal Consortium Ltd (TCC), a joint venture between QinetiQ and the University of Strathclyde, has just completed its first year of trading. In the 14 months up to the end of March 2002, TCC developed a healthy order book of over £750,000, with income forecast to break the £1 million mark in year two. Customers are spread across the globe, with orders in from the USA, Europe, and Asia.

CEO Tony Vere stated that perhaps even more encouraging than the order book was the fact that TCC was fast putting together an expert team, which was beginning to produce exciting technical results. First round customers were back at the table negotiating repeat programmes, one or two of which were already in place.

Key to the development of new technology is the company's own internal research programme aimed at generating new materials and processes. Technical Director Hugh Gallagher and CEO Tony Vere were enthusiastic about the degree of collaboration and encouragement received from all areas of the Scottish commercial development activity, especially the Scottish Optoelectronics Association, Connect and Scottish Enterprise. (TCC recently won a SMART award to develop new processes for the production of piezoelectric crystals).

The Crystal Consortium Ltd (TCC) was spun-out from crystal growth research groups at the OMRC (Optical Materials Research Centre) of the Applied Physics Dept of Strathclyde University and the Bulk Optical Materials Group at QinetiQ's Malvern site (formerly DERA). The company develops synthetic crystals for electronic and optoelectronic applications, ranging from components for fibre-optic networks through, medical imaging to high grade sonar and a wide range of vibration and anti-vibration equipment.



The Crystal Consortium Ltd does not sell crystals but provides solutions for a variety of clients to all sorts of problems associated with crystal growth.

TCC's business model is unusual in the semiconductor and optoelectronics world in that the company does not sell crystals. It works with both suppliers and users to provide effective solutions to all sorts of problems associated with crystal growth and assessment. This includes the selection of the right material and growth process and definition of the most effective performance assessment methods. The invariable objective is improved performance coupled with improved yields and reduced costs. At one end of the scale this may involve little more than a day or two's consultancy, whilst at the other, TCC works with its customers on joint development programmes to improve existing materials and commercialise new ones.